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Update on ovulation-control programs for artificial insemination of lactating dairy cows

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Update on ovulation-control programs for artificial insemination of lactating dairy cows

Abstract

Use of timed AI programs has become commonplace on most dairy farms either because cows are not watched sufficiently to detect estrus, or because expression of estrus is limited by confinement housing. A number of programs are available to set up firstpostpartum inseminations that include some timed AI or timed AI of all cows once the end of voluntary waiting period (VWP) is reached. One approach may include a period of heat detection and AI until, for example, 100 days in milk, when a timed AI protocol is applied to all previously non-inseminated cows. Another approach includes injections of prostaglandin F2α, followed by periods of heat detection and AI, until a timed AI protocol is applied to all previously non-inseminated cows. Another approach may use a timed AI protocol that is applied so all cows can be first inseminated after the end of the VWP. The most sophisticated system involves presynchronizing estrous cycles during the latter part of the VWP and then applying a timed AI protocol. When protocols are applied correctly, ensuring that each cow is injected and inseminated appropriately, conception rates are either equal to, or slightly less, than those achieved when inseminations are based solely on behavioral signs of estrus (i.e., standing estrus). In contrast, pregnancy rates are almost always greater because more cows are inseminated (PR = AI submission rate x conception rate). Early application of Ovsynch before pregnancy status is known can allow all open cows to be re-inseminated by 2 to 3 days after their nonpregnant status is confirmed. This last program can essentially eliminate heat detection; when heats are observed, however, it becomes a bonus to the system.; Dairy Day, 2005, Kansas State University, Manhattan, KS, 2005; Dairy Research, 2005 is known as Dairy Day, 2005

Keywords

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UPDATE ON OVULATION-CONTROL PROGRAMS FOR ARTIFICIAL INSEMINATION OF LACTATING DAIRY COWS

J. S. Stevenson

Summary

Use of timed AI programs has become commonplace on most dairy farms either because cows are not watched sufficiently to detect estrus, or because expression of estrus is limited by confinement housing. A number of programs are available to set up first-postpartum inseminations that include some timed AI or timed AI of all cows once the end of voluntary waiting period (VWP) is reached. One approach may include a period of heat detection and AI until, for example, 100 days in milk, when a timed AI protocol is applied to all previously non-inseminated cows. Another approach includes injections of prostaglandin $F_{2\alpha}$, followed by periods of heat detection and AI, until a timed AI protocol is applied to all previously non-inseminated cows. Another approach may use a timed AI protocol that is applied so all cows can be first inseminated after the end of the VWP. The most sophisticated system involves presynchronizing
estrous cycles during the latter part of the VWP and then applying a timed AI protocol. When protocols are applied correctly, ensuring that each cow is injected and inseminated appropriately, conception rates are either equal to, or slightly less, than those achieved when inseminations are based solely on behavioral signs of estrus (i.e., standing estrus). In contrast, pregnancy rates are almost always greater because more cows are inseminated (PR = AI submission rate × conception rate). Early application of Ovsynch before pregnancy status is known can allow all open cows to be re-inseminated by 2 to 3 days after their nonpregnant status is confirmed. This last program can essentially eliminate heat detection; when heats are observed, however, it becomes a bonus to the system.

(Key Words: Ovulation Control, Artificial Insemination.)

Introduction

In 1995, Kansas ranked 30th in total milk production and dairy cow numbers and 36th in milk production per cow in the United States. Since that time, a major revitalization of the industry has occurred. Kansas has experienced an 88% increase in total milk production, 38% increase in dairy cow numbers, and a 36% increase in milk yield per cow during the past 10 years. At the end of 2004, Kansas ranked 18th in total milk production, 19th in dairy cows, and 11th in milk production per cow. With this growth, we find that the majority of our cows are housed in confinement, in which they are nearly always on concrete except during the dry period.

Expression of estrus is greater when cows are housed on surfaces other than concrete. Given a choice between a grooved concrete surface and dirt, most cows choose to mount and stand on dirt where footing is more sure. Cow barns that are flushed, despite having adequately grooved concrete floors, become slick with age, and may suppress heat expression. Not only is heat expression reduced in

such environments, but with fewer people to manage more cows, time spent observing cows for sexual behavior is often nonexistent. Heat detection is now the same as reading tail-chalk rubs, coupled with occasional palpation to verify uterine tone and presence of mucus. As a consequence, timed AI programs have become popular to replace watching cows for heat and replace inseminations based on sexual behavior.

The objective of this update is to review several programs that can be used to set up cows for first inseminations after calving, to supplement or entirely replace once-standard heat-detection and AI programs.

Heat Detection + Cleanup Timed AI

For those who want to use heat detection and artificially inseminate as many as cows as are detected in heat, the program described in Figure 1 fits that objective. At the end of the VWP, all cows detected in heat are inseminated according to conventional procedures and the a.m./p.m. rule.

Once cows reach so many days in milk and are not yet bred (e.g., by 100 days in milk), the Ovsynch protocol is applied to these non-inseminated cows to ensure that they are bred within 10 days. If cows show estrus during that protocol, they should be inseminated according to the a.m./p.m. rule and the remaining protocol should be discontinued.

Prostaglandin + Heat Detection + Cleanup Timed AI

If your objective is to breed more cows at standing heat after the VWP, a PGF injection can be given near the end of the VWP to induce heats before AI. If desired, after 14 days, all non-inseminated cows can be reinjected, followed again by heat detection and AI (Figure 2). As in the previous protocol, once cows reach so many days in milk and are not yet inseminated, a timed AI protocol is applied.

Timed AI (Ovsynch)

A timed AI protocol such as Ovsynch can be used if you want to use limited heat detection before first services (Figure 3). When the Ovsynch protocol is applied, a few cows may show heat early during the protocol. They should be inseminated according to the a.m./p.m. rule, and the remaining hormone injections should be discontinued. It is not necessary to inject GnRH if the cow shows good heat before AI. The best time to do a timed insemination is between 0 and 24 hours after the second GnRH injection. Conception rates generally are slightly better when cows are inseminated at 16 hours, but 16 hours is impractical in most large herds, and cows are generally inseminated at either 0 or 24 hours after the second GnRH injection. Inseminations at 24 hours tend to be slightly better than at 0 hours, but that means those cows must be handled twice on consecutive days, rather than once when AI is done at the same time as the second GnRH injection.

Presynch + Ovsynch

Presynchronizing estrous cycles before applying Ovsynch generally improved conception rates achieved after timed AI (Figure 4). Several published studies indicate that conception rates are improved by about 10 to 15 percentage points. In the original studies, the interval between the two Presynch PGF injections was 14 days, but the interval between the second Presynch injection and the first GnRH injection of Ovsynch was 12 days. Some have changed that second interval to 14 days. If using a 12-day interval, the Presynch injections can be administered on Wednesdays and Ovsynch begins 12 days later, on a Monday. For the 14-day interval, the Pre-

synch injections are administered on Mondays, and Ovsynch begins 14 days later, on a Monday.

No Heat Detection, Timed-AI System

For those wanting to eliminate heat detection, the system illustrated in Figure 5 will fit that objective. This protocol sets up all cows for first services, and the Ovsynch protocol is initiated by administering GnRH to all cows 7 days before they are to be pregnancy diagnosed [assuming that cow has not been re-bred based on recurring heat at the first eligible cycle after first AI (20 to 25 days after timed AI)]. For those cows found open 7 days later, the remaining injections of Ovsynch are given (PGF, followed by GnRH in 48 hours and timed AI). This system is currently being applied on dairy farms with success.

Available Products for Use in Timed-AI Programs

A number of prostaglandin (Table 1) and GnRH (Table 2) products are available for use in these programs. All products are effective if used at the appropriate dosages. Use at least 1-inch needles when administering (i.m.) these products. A 1.5-inch needle is even better to ensure that all of the product is placed deep in the muscle and does not flow back out through the injection site. Flow back is a problem when using larger than 18-gauge needles. Ensure that injection sites are clean before injecting product. To prevent transmission of blood-borne diseases (e.g., bovine leukosis or anaplasmosis), use needles only once.

Table 1. Current Prostaglandin $F_{2\alpha}$ Products Available for Use in Cattle[1]

Product	Supplier	Recommended Dose	Labeled Use
Lutalyse®	Pfizer Animal Health	25 mg i.m. (5 cc)	Dairy heifers Lactating dairy cows
Estrumate®	Schering-Plough Animal Health Hoechst Roussel Vet.	0.5 mg i.m. (2 cc)	Dairy heifers Lactating dairy cows
Prostamate® (generic of Lutalyse)	IVX Animal Health/Phoenix Sci.	25 mg i.m. (5 cc)	Dairy heifers Lactating dairy cows
In-Synch® (generic of Lutalyse)	Agri Labs	25 mg i.m. (5 cc)	Dairy heifers Lactating dairy cows

[1]These are prescription products only available from a licensed veterinarian.

Table 2. Current GnRH Products Available for Ovulation[1]

Product	Chemical Form	Dose	U.S. Supplier
Cystorelin®	Gonadorelin diacetate hydrochloride	100 µg i.m. (2 cc)	Merial Limited, Iselin, NJ
Factrel®	Gonadorelin hydro-chloride	100 µg i.m. (2 cc)	Fort Dodge Labs
Fertagyl®	Gonadorelin	100 µg i.m. (2 cc)	Intervet, Inc.
OvaCyst®	Gonadorelin diacetate hydrochloride	100 µg i.m. (2 cc)	IVX Animal Health/Phoenix Scientific

[1]These are prescription products only available from a licensed veterinarian.

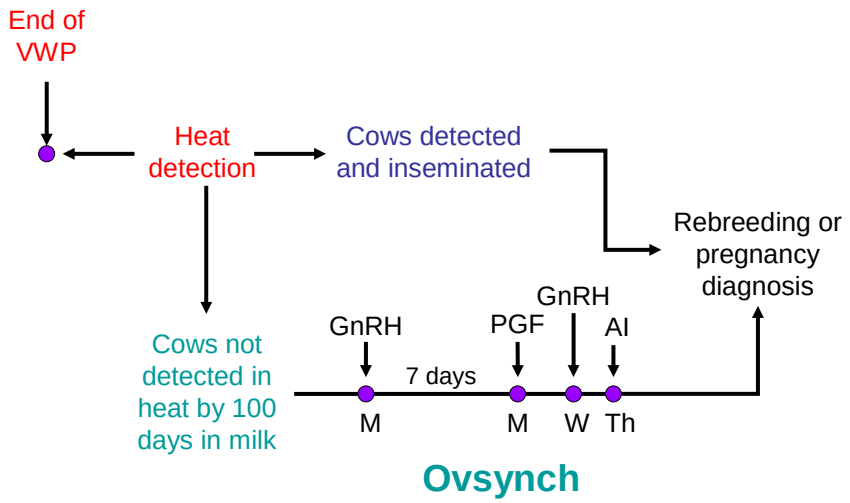


Figure 1. Heat Detection Plus Cleanup Timed AI.

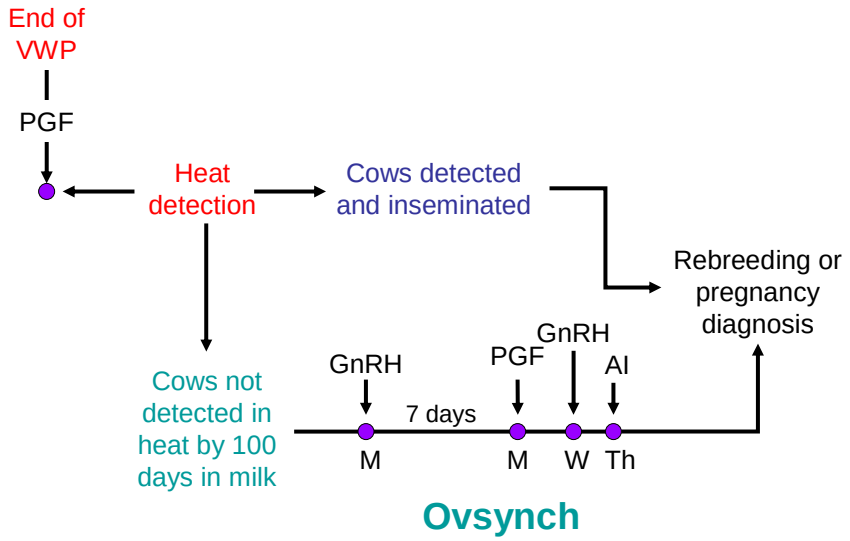


Figure 2. Prostaglandin (PGF)-induced Heats, Followed by Heat Detection Plus Cleanup Timed AI.

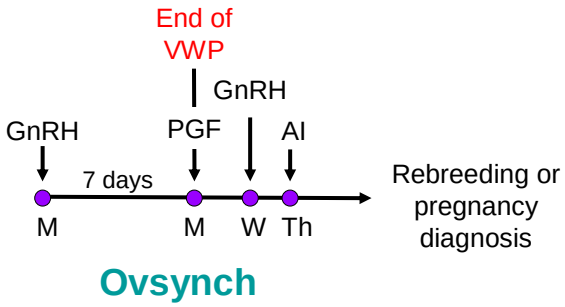


Figure 3. A Timed-AI Protocol (Ovsynch).

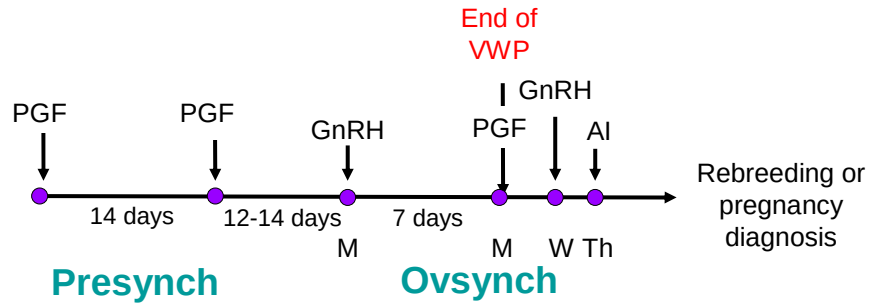
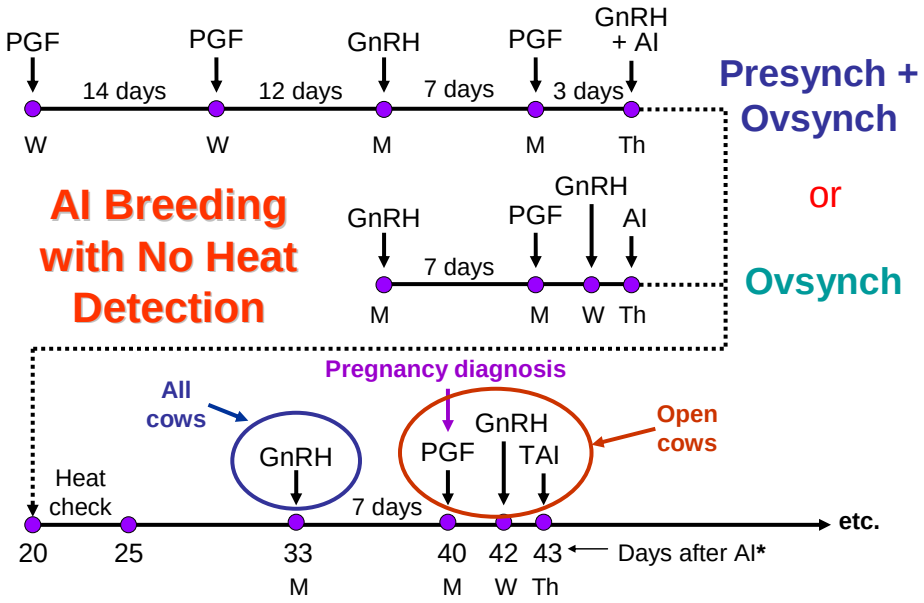


Figure 4. Presychronized Estrous Cycles (Presynch) Before a Timed-AI Protocol (Ovsynch) to Set Up First Postpartum Inseminations.



*For weekly pregnancy checks: range in days since last AI at pregnancy diagnosis is 40 to 46 days. For biweekly pregnancy checks: range in days is 40 to 53 days.

Figure 5. No-heat-detection System that Applies Either Presynch + Ovsynch or Ovsynch to Cows to Set Up First Services, and Then Begins the Ovsynch Protocol (first GnRH injection) 7 Days Before Cows are Checked for Pregnancy. The Ovsynch Protocol is Only Completed in Open Cows.